

WHAT IS CLAIMED IS:

1. A midsole including a cushioning structure, which is provided between an outer sole and an upper and is suitable for absorbing a shock of landing, wherein:

the cushioning structure comprises a thick plate-shaped or column-shaped cushioning portion;

a plurality of grooves is formed on an outer peripheral surface of the cushioning portion;

the respective grooves are helically formed around a substantially vertical axial line;

the respective grooves are arranged substantially parallel with each other; and

a range in which each of the grooves is formed is larger than a range of 15 degrees around the axial line and smaller than a range of 180 degrees around the axial line.

2. A midsole including a cushioning structure according to claim 1, wherein a lead angle between the groove and a horizontal plane is set within a range of 35 degrees to 60 degrees.

3. A midsole including a cushioning structure according to claim 1, wherein:

the respective grooves are provided to be continuous from an upper end of the cushioning portion to a lower end of the cushioning portion; and

the lead angle is set to be substantially constant from the upper end to the lower end.

4. A midsole including a cushioning structure according to claim 1, wherein the outer peripheral surface of the cushioning portion is formed to be taper-shaped.

5. A midsole including a cushioning structure, which is provided between an outer sole and an upper and is suitable for absorbing a shock of landing, comprising:

a midsole body defining a cavity; and

a cushioning part fitted in the cavity, wherein:

the cushioning part is formed of elastomer;

Young modulus of a member constituting the cushioning part is set to be a value smaller than Young modulus of a member constituting the midsole body;

the cushioning part includes a through hole passing through the cushioning part from its upper surface to its lower surface, whereby the cushioning part is formed into a ring shape having an outer peripheral surface and an inner peripheral surface;

a plurality of first grooves is formed on the outer peripheral surface of the cushioning part;

a plurality of second grooves is helically formed on the inner peripheral surface of the cushioning part;

the respective first grooves are helically formed around a substantially vertical axial line;

the respective first grooves are arranged substantially parallel with each other; and

a range in which each of the grooves is formed is larger than a range of 15 degrees around the axial line and smaller than a

range of 180 degrees around the axial line.

6. A midsole including a cushioning structure, which is provided between an outer sole and an upper and is suitable for absorbing a shock of landing, comprising:

- a midsole body defining a cavity; and

- a cushioning part fitted in the cavity, wherein:

- the cushioning part is formed of elastomer;

- Young modulus of a member constituting the cushioning part is set to be a value smaller than Young modulus of a member constituting the midsole body;

- the cushioning part includes a through hole passing through the cushioning part from its upper surface to its lower surface, whereby the cushioning part is formed into a ring shape having an outer peripheral surface and an inner peripheral surface;

- a plurality of grooves is helically formed on the outer peripheral surface of the cushioning part, the grooves being arranged substantially parallel with each other; and

- a plurality of grooves is helically formed on the inner peripheral surface of the cushioning part, the grooves being arranged substantially parallel with each other.

7. A midsole including a cushioning structure according to claim 6, wherein the grooves formed on the outer peripheral surface and the grooves formed on the inner peripheral surface are arranged so that when compression load is applied to the cushioning part in a vertical direction, a rotating force is generated to twist the cushioning part around a substantially vertical axial

line in one direction.

8. A midsole including a cushioning structure according to claim 7, wherein at least one of the outer peripheral surface and the inner peripheral surface of the cushioning part is formed to be taper-shaped.

9. A midsole including a cushioning structure according to claim 8, wherein the grooves are formed to be continuous from an upper end of the cushioning part to a lower end of the cushioning part.

10. A midsole having a cushioning structure, which is provided between an outer sole and an upper and is suitable for absorbing a shock of landing, comprising:

- a midsole body defining a cavity; and

- a cushioning part fitted in the cavity, wherein:

- the cushioning part is formed of elastomer;

- Young modulus of a member constituting the cushioning part is set to be a value smaller than Young modulus of a member constituting the midsole body;

- the cushioning part is formed into a plate shape having an upper surface and a lower surface;

- a plurality of helical grooves and/or convex portions is formed on at least one of the upper surface and the lower surface of the cushioning part; and

- a thickness of the cushioning part is gradually changed along the grooves and/or the convex portions.

11. A midsole including a cushioning structure, which is provided between an outer sole and an upper and is suitable for absorbing a shock of landing, comprising:

a midsole body defining a cavity; and

a cushioning part fitted in the cavity, wherein:

the cushioning part is formed of elastomer;

Young modulus of a member constituting the part is set to be a value smaller than Young modulus of a member constituting the midsole body;

the cushioning part includes an upper surface and a lower surface;

the midsole body includes a support surface for supporting the lower surface of the cushioning part in the cavity;

a plurality of helical convex portions biting into the lower surface of the cushioning part, and/or a plurality of helical grooves into which part of the lower surface of the cushioning part is deformed to be embedded, are/is formed on the support surface; and

when compression load is applied to the cushioning part in a vertical direction, the convex portions and/or the grooves generate a rotating force to twist the cushioning part around a substantially vertical axial line.

12. A midsole including a cushioning structure according to claim 11, further comprising:

a cap arranged over the cushioning part and closing the cavity, wherein:

a lower surface of the cap is in contact with the upper

surface of the cushioning part; and

at least one of a plurality of helical convex portions biting into the upper surface of the cushioning part and a plurality of helical grooves into which part of the upper surface of the cushioning part is deformed to be embedded, is formed on the lower surface of the cap.